resolved into sarcous elements of great distinctness and beauty, while new and similar fibrillæ are developed along its sides in the way already explained. The subsequent series of changes do not differ materially from those that occur in the inferior classes.

It is evident that this description of the development of muscular fibre is entirely opposed to the cellular theory of Schwann; while it agrees in some points with that of Lebert (Annales des Scien. Nat. 1849–50), but more with that of Savory (Phil. Trans. 1855). In no instance have I found that nucleated *cells*, properly so called, are concerned in the office of development; for the finely granular blastema attached to the nuclei, although it frequently assumes the shape of a fusiform *cell*, is not invested with a cell-*wall*, in the proper sense of the word. Such an envelope, however, is sometimes simulated by the investing sarcous substance or fine lateral fibrillæ when they are first laid down on the sides of the fusiform mass and meet each other at each extremity to form a single fibre or process. Indeed, according to my own observations, as already remarked, this is precisely the mode in which the *organic* muscular-fibre-cell is developed; so that the *striped* muscular fibre, instead of being the *product* of nucleated *cells*, would appear to be itself, at first, an instance or mode of cell-formation, which finds its prototype in the *organic* muscular fibre-cell, and in which the cell-*wall* is substituted and represented by the investing sarcous substance.

II. "On the Influence of Temperature on the Electric Conducting Power of the Metals." By A. Matthiessen, Esq., F.R.S., and M. von Bose. Received December 5, 1861.

(Abstract.)

In the first part of the paper we have described the apparatus used for the experiments, together with the precautions taken to ensure correct results; in the second we have given the results obtained with the pure metals—silver, copper, gold, zinc, tin, arsenic, antimony, bismuth, mercury—and the metalloid tellurium. The conducting power of the wires, or bars of each, was determined at about 12°, 25°, 40°, 55°, 70°, 85°, and 100° C.; and from the mean of the eight observations made with each wire (four at each temperature on heating,

and four on cooling), we deduced a formula by the method of least squares for the correction of the conducting power for temperature. It was found that the conducting power or resistance of a metal does not decrease or increase in direct ratio to the temperature, as stated by Becquerel *, Arndsten †, and Siemens ‡, who assume that the formula for the correction of resistance for temperature between 0°–100° may be expressed by

$$\lambda = x + yt,$$

but that, on the contrary, the formula must be

$$\lambda = x + yt + \gamma t^2,$$

where λ is the resistance at t degrees, x the resistance at 0°, and y and γ constants. One fact seems to have escaped the observation of former experimenters, namely, that when a wire of a metal is heated for the first time to 100° and again cooled, an alteration in the conducting power takes place; with most metals it is necessary to heat them for several days before their conducting power becomes constant. In the third part we have deduced from the results obtained, the law that *all pure metals in a solid state vary in conducting power to the same extent between* 0° *and* 100° C. In cases where very great accuracy is required, it is absolutely necessary to experiment on the conductor itself; for we have found almost the same differences between formulæ obtained for wires of the same metal as between the mean of those deduced for the different metals. This behaviour may be attributed to the fact that the molecular arrangement is not the same even in wires of the same metal; for we find that copper wires, when kept at 100° for several days, behave very differently from each other: thus, in the case of the three copper wires experimented with, wire 1 increased in conducting power almost to the same extent as if it had been annealed, wire 2 partially so, and wire 3 hardly at all. With bismuth, wire 1 increased its conducting power 16 per cent.; wire 2, 19 per cent.; and wire 3, 12 per cent. Again, in the case of cadmium, which becomes quite brittle and crystalline at 80° (for cadmium may be powdered in a hot mortar), we found the formula for each wire very different. On the other hand, the formulæ of the wires of those metals which, after being kept at 100° for some time, show a very slight or no alteration in the conducting power

* Ann. de Chim. et de Phys. (3) xvii. 242. † Pogg. Ann. civ. 1.

‡ Pogg. Ann. cxiii. 91.

on again being cooled, agree very closely with each other. Compare those of lead, tin, and mercury.

Metalloids conduct electricity better when heated than when cold. Hittorf* proved this to be the case with selenium. Gas-coke and graphite†, and the gases‡, follow the same law. Tellurium, when first heated to 70° or 80° C., behaves as a metal, that is to say, it loses in conducting power up to that temperature, when it then begins to gain. The temperature of the turning-point becomes lower after each day's heating, until, as with the first and third bars experimented with, it is below the lowest temperature at which observations were made. Taking the first observed conducting power of each bar $=100$, we found that the conducting power of bar 1 had decreased after thirteen days' heating to 4, where it then remained constant; that of bar 2, after thirty-two days, became constant at 19; and that of bar 3, after thirty-three days, at 6. With bar 2 the conducting power decreased up to 29°·4, when it began again to increase. The behaviour of tellurium is therefore intermediate between that of the metals and that of the metalloids.

III. "Notes of Researches on the Poly-Ammonias."—No. XIX. Aromatic Diamines. By A. W. Hofmann, LL.D., F.R.S. Received December 16, 1861.

Whilst engaged in the examination of the polyatomic ammonias of the ethylene-series, I have repeatedly endeavoured to produce the diatomic bases corresponding to the aromatic monamines. The composition and general characters of these compounds were sufficiently indicated by the examination of ethylene-diamine. The simple relation which the latter body bears to ethylamine,

$$\text{Ethylamine } \left.\begin{matrix} C_2H_5 \\ H \\ H \end{matrix}\right\} N, \qquad \text{Ethylene-diamine } \left.\begin{matrix} (C_2H_4)'' \\ H_2 \\ H_2 \end{matrix}\right\} N_2,$$

could leave no doubt regarding the existence of a series of diatomic aromatic ammonias similarly related to aniline and its homologues.

* Pogg. Ann. lxxxvi. 214. † Phil. Trans. 1858, p. 586.
‡ Ann. de Chim. et de Phys. (3) xxxix. 355.